Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

Plant Industry Sub-branch

UNITED STATES
DEPARTMENT OF AGRICULTURE
LIBRARY

BOOK NUMBER 1
Ag84D
v. 226-250
1922-1923
531123

GPO 8—7671

USDA, National Agricultural Library
NAL Bldg
10301 Baltimore Blvd
Beltsville, MD 20705-2351

# WHITE-PINE BLISTER RUST

IN THE

# WESTERN UNITED STATES

UNITED STATES DEPARTMENT OF AGRICULTURE
DEPARTMENT CIRCULAR 226

Contribution from the Bureau of Plant Industry
(Office of Blister-Rust Control, in Cooperation with the Office of Investigations in Forest Pathology)

Washington, D. C. June, 1922

WASHINGTON : GOVERNMENT PRINTING OFFICE : 1922

FIG. 1.—A VERY BADLY DISEASED YOUNG WHITE-PINE TREE.

Note the large number of blisters, which means that millions upon millions of blister-rust spores have been produced and disseminated from this tree.

# WHITE-PINE BLISTER RUST IN THE WESTERN UNITED STATES.

## WHAT IT IS—HOW IT SPREADS—WHAT YOU SHOULD DO—VALUES AT STAKE.

### THE WHITE-PINE BLISTER RUST.

This pest (*Cronartium ribicola* Fischer) is native to Europe, and its destructiveness has prevented the growing of white pine as a forest tree in northern Europe. It was introduced into the eastern United States about twenty years ago on diseased white pine shipped from Europe. White-pine blister rust is now established beyond hope of eradication in New England, New York, and the Lake States and has proved to be a formidable enemy to the eastern white pine (Fig. 1). Until very recently our great forests of western white pine (*Pinus monticola*) and sugar pine (*P. lambertiana*) have been free from this disease, but in the autumn of 1921 the blister rust was found in western British Columbia and the Puget Sound region of Washington. Western forests of white pine[1] with a stumpage value of $228,000,000 are now and for the first time directly menaced by the blister rust. They can be saved from extensive invasion only by the prompt, vigorous, and concerted action of everyone in the West.

White-pine blister rust is a destructive disease of white pines, i. e., those pines which bear their needles in bundles of five. It is caused by a fungus which can attack the pines only after it has grown on the leaves of wild or cultivated currant or gooseberry bushes. While on the pines the blister-rust fungus lives in the bark. At first its presence is not noticeable, but slowly the bark swells and within several years from the time of infection, the blisters from which the disease gets its name push through the bark early in the spring. These are small protruding sacs, appearing as illustrated in Figure 2.

These sacs break open and liberate millions of yellow spores (like seeds) which are carried about by the wind and infect the leaves of

[1] White pine refers to five-needle pines only and should not be confused with western yellow pine, sometimes known in the trade as white pine. California sugar pine and western white pine, also called Idaho white pine, are the most important commercial species of five-needle pines.

103514°—22

currant and gooseberry plants. Here the disease appears in early summer as a yellow rust on the under side of the leaves, as shown in Figure 3. The spores from this stage can not infect the pines, but are blown about and infect other currant and gooseberry leaves. Later in the same season the late summer stage of the rust appears on the diseased leaves. This consists of numerous small, brown, hair-like projections, illustrated in Figure 4, likewise on the lower leaf surfaces. The spores from this stage can not infect currant and gooseberry leaves, but when blown to a white-pine tree (Fig. 5) they infect it, thus completing the life cycle of the fungus. This disease kills the pines by working in the bark and girdling the tree. Its effect is slow, but very deadly. In general, a small tree will be killed in a shorter time than a large one, but the large tree is no more resistant to infection and ultimate death than the smallest seedling.

## COMMON TYPES OF CURRANTS AND GOOSEBERRIES.

The accompanying illustrations (Figs. 6 to 9, inclusive) show a few of the different kinds of wild currants and gooseberries commonly found in the Pacific Northwest, as well as the cultivated black currant, which is especially dangerous to white pines.

FIG. 6.—Wild gooseberry (*Grossularia divaricata*).

FIG. 7.—Wild red-flowering currant (*Ribes sanguineum*).

## BLACK CURRANTS MOST DANGEROUS.

The cultivated black currant (English black currant, *Ribes nigrum*) takes the disease more severely and spreads it to pine and to other currant and gooseberry plants much more rapidly than any other wild or cultivated species. The red and white garden currants and the garden gooseberries, as well as most of the wild currants and gooseberries, take the disease readily enough after it is estab-

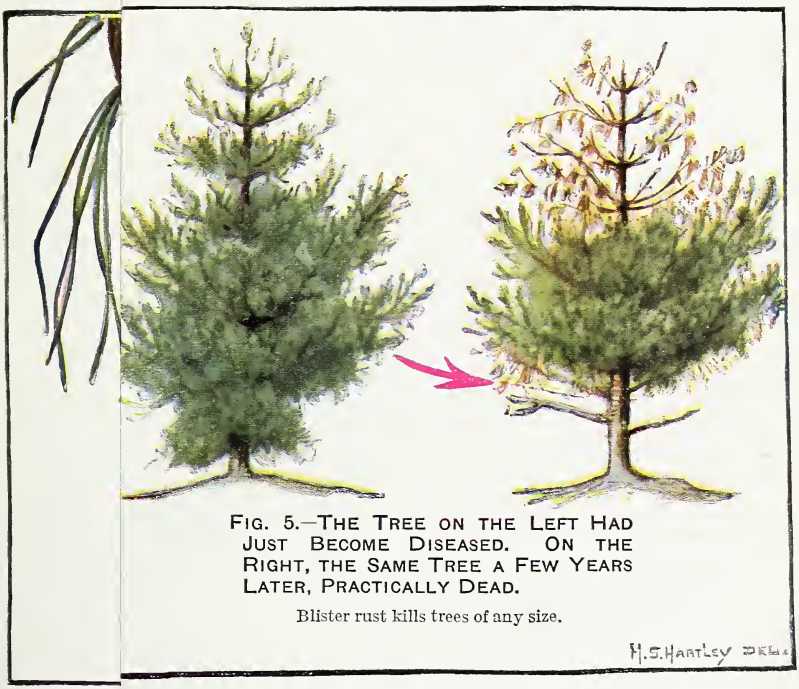


FIG. 5.—THE TREE ON THE LEFT HAD JUST BECOME DISEASED. ON THE RIGHT, THE SAME TREE A FEW YEARS LATER, PRACTICALLY DEAD.

Blister rust kills trees of any size.

# HOW IT SPREADS

FIG. 2.—BRANCH OF WHITE PINE AFFECTED WITH BLISTER RUST.

The blisters are natural size and produce spores ("or seeds") which grow only on currant and gooseberry leaves.

FIG. 3.—UNDER SIDE OF CURRANT LEAF WITH CLUSTERS OF BLISTERS—THE EARLY SUMMER STAGE.

Produces spores which grow only on currants and gooseberries.

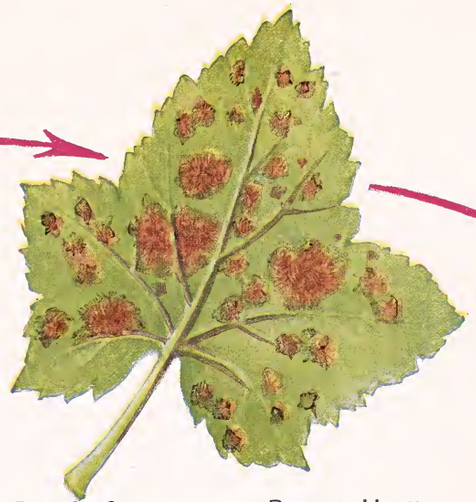

FIG. 4.—CLUSTERS OF BROWN HORN-LIKE COLUMNS OF SPORES—THE LATE SUMMER STAGE.

Produces spores which grow only on white pines.

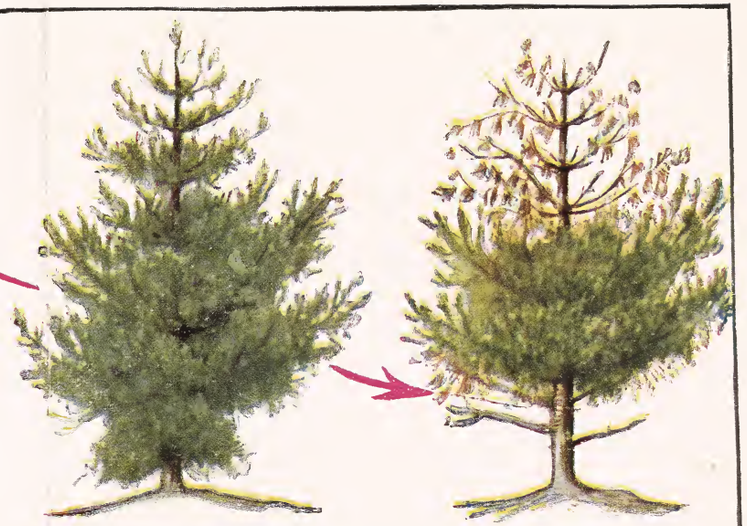

FIG. 5.—THE TREE ON THE LEFT HAD JUST BECOME DISEASED. ON THE RIGHT, THE SAME TREE A FEW YEARS LATER, PRACTICALLY DEAD.

Blister rust kills trees of any size.

H. S. HARTLEY DEL.

lished in a community. However, they are less likely to spread the disease than the black currant.

The blister rust as yet is not established firmly in the Western States. The greatest danger of its becoming established quickly on native trees depends to a large extent upon the occurrence of the English black currant in proximity to white pine, because if the disease gains entrance to any locality it will soon spread from this species to the pines and all kinds of currants and gooseberries. The immediate destruction of all black currants is the most effective means of preventing the blister rust from gaining a foothold in the western pine forests.

Fig. 8.—Wild stink currant (*Ribes bracteosum*).

Fig. 9.—Cultivated black currant (*Ribes nigrum*).

## WHAT YOU SHOULD DO.

### HELP ENFORCE QUARANTINES.

State and Federal regulations or quarantines have been promulgated with the view of preventing the further introduction and spread of the blister rust in the western United States. These quarantines restrict the movement of five-needle pines and of currants and gooseberries as follows: They (1) prohibit their entrance into the United States from any foreign country, including Canada; (2) prohibit their movement from all States east of and including Minnesota, Iowa, Missouri, Arkansas, and Louisiana, interstate, to points outside the quarantined area; and (3) prohibit their movement out of that part of Washington west of the summit of the Cascade Mountains to the rest of Washington or to any other State.

On five-needle pines blister rust is very deceptive and is not noticeably visible for several years after infection takes place. On dormant

currant and gooseberry bushes the disease can not be detected without a close microscopic examination. Owing to these facts the quarantine regulations include all host plants and not merely those which are visibly infected.

Do not ask nurserymen or your friends to ship currant and gooseberry plants or five-needle pines in violation of the quarantine. Report any violations you observe to the State nursery inspector.

### FIND AND DESTROY INFECTED PLANTS.

It is of vital importance to locate and immediately destroy the blister rust wherever found in the West. Everyone can materially assist in this work. Examine the under side of the leaves of all currant and gooseberry bushes in gardens, especially the English black currants, and also any native or planted white pines in your community. If these plants appear to be diseased in a manner similar to that shown in Figures 2 to 5, send some of the diseased material immediately to the State nursery inspector or the agricultural experiment station in your State, together with your name and address and particulars as to the location of the plants.

Do not plant black currants. To do so is to help the blister rust to become rapidly and firmly established in the West and thus to destroy the valuable western white-pine forests.

Your State and county officials are now actively engaged in preventing the blister rust from becoming a widespread menace. In localities where blister rust is found, it will be necessary to remove all black currants without delay to prevent the rapid spread of the disease. If you live in one of these communities, you can help very materially by destroying your black currants and asking your neighbors to do likewise.

## VALUES AT STAKE.

### IMPORTANCE OF WHITE PINES IN THE WEST.

The present stand of commercial five-needle pines in the United States is 78,571 million board feet. Approximately three-fourths of this timber, 57,071 million board feet, is in the western forests. The two important commercial species are western white pine and sugar pine. These are the most valuable forest trees found in the West. In Idaho, from 1914 to 1918, more than one-third of the lumber produced was western white pine, and in California during the same period one-tenth of the lumber produced was sugar pine. The lumber manufactured from these pines is more valuable than that of other species; therefore these proportions are greater in dollar value than in board feet.

The distribution and estimated present stand of white pines in the United States and Canada is shown in Table 1.

TABLE 1.—*Stand of the three most important five-needle pines in North America (in million board feet).*

| Variety. | North America. | Canada. | United States. | Montana. | Idaho. | Washington. | Oregon. | California. |
|---|---|---|---|---|---|---|---|---|
| Western white pine (*Pinus monticola*) | 24,755 | 2,700 | 22,055 | 855 | 19,305 | 820 | 900 | 175 |
| Eastern white pine (*Pinus strobus*) | 81,500 | 60,000 | 21,500 | ..... | ..... | ..... | ..... | ..... |
| Sugar pine (*Pinus lambertiana*) | 35,016 | ..... | 35,016 | ..... | ..... | ..... | 5,016 | 30,000 |

### OWNERSHIP AND RESPONSIBILITY.

Federal holdings contain 25 per cent of the western white-pine stumpage, State holdings 15 per cent, and private holdings 60 per cent. The Federal Government also owns 40 per cent of the sugar-pine stumpage, and private interests 60 per cent. There are no species in the western white-pine region of Idaho and in the sugar-pine region of California that can replace these two trees in quality and value. Their loss would be a serious blow to the lumber and wood-using industries. In the five-needle pine regions of the West every thousand board feet of lumber manufactured, irrespective of ownership, means an average of $13 to $16 in pay rolls and supplies in the community and State. This represents a community interest far greater than that of the individual stumpage owner. It is therefore apparent that protection of the white-pine forests is a matter of individual, State, and national concern.

### PRESENT DANGER.

Northwestern Washington, where the white-pine blister rust has been found, is directly connected with Idaho and California by unbroken chains of five-needle pines, and scattered among these pines are some 60 species of wild currants and gooseberries that are possible carriers of the disease. Therefore the blister rust, *unless checked*, will eventually spread by natural means throughout the commercial white-pine regions. The large numbers of currants and gooseberries in these forests would make the damage enormous and rapid before local control measures could be effectively applied. The greatest assurance of protection for the forests lies in the exclusion of the disease. This is only possible by concerted and timely action to exterminate it.

○